

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HIMANSHU B. VAKIL

Appeal No. 94-4428
Application 08/024,034¹

ON BRIEF

Before JOHN D. SMITH, ELLIS and OWENS, Administrative Patent Judges.

JOHN D. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal pursuant to 35 USC § 134 from the final rejection of claims 1 through 11 and 14 through 16.

Claim 1 is representative and is reproduced below:

¹ Application for patent filed March 1, 1993.

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1. A method of producing a spallation-resistant protective layer on the surface of a nickel- or cobalt-based superalloy substrate, said method comprising the steps of:

depositing an adherent metal aluminide layer on said substrate, the metal aluminide in said layer being nickel or cobalt aluminide;

depositing an aluminum oxide layer on the surface of said metal aluminide layer; and

heating said aluminum oxide layer.

The references of record relied upon by the examiner are:

Lory et al. (Lory)	4,675,089	Jun. 23, 1987
Strangman et al. (Strangman)	4,880,614	Nov. 14, 1989

Morosanu, Thin Films Science and Technology, 7, "Thin Films by Chemical Vapour Deposition", pages 429-430 and 445 (1990).

Kiyono et al. (Kiyono)	59-181318	Oct. 15, 1984
(Japanese Kokai Patent)		

Claims 1 through 3 and 6 through 8 stand rejected under 35 USC § 103 over Strangman in view of Lory. Claims 4 and 5 stand similarly rejected under the same section of the statute further in view of Morosanu. Additionally, claims 9 through 11 stand rejected under 35 USC § 103 in view of the combined teachings of Strangman, Lory, and Kiyono.

We reverse.

The subject matter on appeal generally relates to the formation of protective coatings on nickel- and cobalt-based superalloy articles of the type used as gas turbine parts. It is known in the prior art to deposit oxidation-resistant coatings on the surfaces of such articles and typically, such coatings are nickel or cobalt aluminide having surfaces which oxidize to form an aluminum oxide (alumina) scale which is tough, adherent and resistant to attack by oxidation (Specification, page 1, lines 27-33). A problem with alumina scales formed by the prior art process is that they tend to spall from the surface of the part, largely as a result of the difference between the coefficient of thermal expansion of the underlying superalloy and the alumina scale (Specification, page 2, lines 1-8). A result of such spallation is further oxidation of the surface aluminide layer to alumina, which can ultimately deplete the aluminum available on the surface (Specification, page 2, lines 8-16).

Appellant's invention is said to be based on the discovery of a method to produce a spallation-resistant alumina layer on an aluminided superalloy article. This is

achieved by the deposition of a layer of alumina on the nickel or cobalt aluminide surface, typically by chemical vapor deposition, followed by heat treatment, typically at a temperature in the range of about 900-1200°C. As disclosed in appellant's specification at page 7, lines 18 through 21, the heat treatment converts a mostly amorphous aluminum oxide layer under tensile stress into a spallation-resistant aluminum oxide layer, which is a stable form of alpha-alumina. Appellants further indicate that it is believed that the heat treatment causes tensile cracking of the top alumina layer, making possible its expansion and contraction without the production of stresses which result in spallation. Finally, a thermal barrier coating such as a zirconia coating may be further deposited on the alumina coated article. See, for example, dependent claims 2 and 3.

At the outset, we note the examiner's contention in the Answer at page 2, which is not disputed by appellant, that the appealed claims stand or fall together. Thus our focus in this decision is primarily directed to the rejection of independent claim 1 for obviousness (35 USC § 103) over Strangman in view of Lory.

According to the examiner, Strangman teaches a method of producing a spallation-resistant protective layer on the surface of a nickel or cobalt based superalloy substrate comprising, inter alia, depositing an alumina layer on the surface of a deposited nickel or cobalt aluminide layer. However, according to the examiner, Strangman does not disclose heating the alumina layer at about 900-1200EC for about 1-2 hours.² See the Answer at page 3. The examiner further contends that it would have been obvious to one of ordinary skill in the art to have annealed the deposited alumina layer at a 1000EC in Strangman's method for converting the deposited layer into a polycrystalline layer as suggested by the secondary reference to Levy, "because it is well known that high temperature annealing can enhance the formation of the crystalline structure of CVD films". See the Answer at page 4, second full paragraph. The examiner further explains in the Answer at pages 9 and 10 that it would have been obvious to have applied the post-annealing as suggested by

² Rather than focusing on multiple differences in multiple claims, the examiner should treat and focus on each claim individually. Claim 1, for example, only requires a step of "heating said alumina oxide layer" without any reference to temperature and time parameters.

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Levy in Strangman's process ?to crystallize the deposited amorphous alumina films as stated in the specification, page 7, lines 14 through 31?.

Appellant points out that Strangman is directed to the superalloy art for the formation of articles of the type used as gas turbine parts while Lory is directed to the art of integrated circuits. Thus appellant contends, and we agree, that the teachings of these references cannot be legitimately combined because they are from different arts. No disclosure in Lory, in our view, is reasonably pertinent to the particular problem with which appellant is involved, which problem may be broadly characterized as the spalling of alumina scales caused as the result of the difference between the coefficient of thermal expansion of an underlying superalloy structure and alumina. Again, see the specification at page 2, lines 3 through 10. Thus, we agree with appellant that Lory cannot be characterized as ?analogous? art. See, for example, In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986); In re Wood, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979).

We further observe that the examiner's contention that it

would have been obvious to crystallize an amorphous film in Strangman's process overlooks the fact that Strangman deposits a high purity, dense chemical vapor deposition alpha alumina layer, i.e., a crystalline layer (column 5, lines 6 through 11). In this regard, we take official notice that alpha alumina is crystalline and is composed of fine hexagonal crystalline plates. See Kirk-Othmer, 3rd Edition, Volume 2, pages 218, 219 and 233-236, particularly page 233, (1978), copy attached. Accordingly, the examiner's rejection of the appealed claims cannot be sustained.

We remand this application to the examiner for further consideration of the disclosure of Strangman at column 6, lines 13 through 18 which has apparently been overlooked by the examiner and appellant. This disclosure appears to suggest that an alpha alumina coated superalloy structure is preheated prior to exposure to a ceramic coating vapor. The examiner should determine whether such a "preheating step" reads on the claimed step of "heating said aluminum oxide layer" which is all that is required by the language of appealed claim 1. Thus, the examiner should determine based on the above disclosure in Strangman whether appealed claim 1

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is unpatentable under either 35 USC § 102(b) or alternatively under 35 USC § 103. The examiner may also wish to extend his search to determine whether or not it would have been obvious to form the alpha alumina layer described in Strangman by a process of heat treating a deposited amorphous film. These questions are best resolved at the examiner's level because the examiner has greater accessibility to the prior art, and appellant has the opportunity to argue the issues absent the restrictions which tie the examiner's hands regarding a rejection made by the Board under 37 CFR § 1.196(b).

We remind the examiner of his ability to reopen prosecution at any time prior to issue for the purpose of ensuring the validity of the claims. As stated by the Supreme Court in Graham v. John Deere, 383 U.S. 1, 18, 148 USPQ 459, 467 (1966):

[I]t must be remembered that the primary responsibility for sifting unpatentable material lies in the Patent Office. To await litigation is - for all practical purposes - to debilitate the patent system.

In summary, each of the examiner's stated rejections

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under 35 USC § 103 is reversed. This application is remanded to the examiner to consider the above matters. By virtue of its ?special? status, this application requires an immediate action,

MPEP § 708.01(d). It is important that the Board be informed promptly of any action affecting the appeal in this case.

REVERSED and REMANDED

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JOHN D. SMITH)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
JOAN ELLIS)	
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
TERRY J. OWENS)	
Administrative Patent Judge)	

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General Electric Company
CRD Patent Docket Rm 4A59
P.O. Box 8, Bldg. K-1-Salamone
Schenectady, NY 12301